Historic, Archive Document

Do not assume content reflects current
scientific knowledge, policies, or practices.

1.9622
N3 R31
Up 2

Research Note

NORTHERN ROCKY MOUNTAIN
FOREST AND RANGE EXPERIMENT STATION

Missoula, Montana

LIBRARY
JUN 26 1952
U. S. DEPARTMENT OF

No. 110 May 1952

A VIGOR CLASSIFICATION FOR MATURE WESTERN WHITE PINE TREES IN THE INLAND EMPIRE

C. A. Wellner[1]
Division of Forest Management Research

Tree vigor is the most important deciding factor in marking western white pine (Pinus monticola) for partial cutting. Tree vigor and a second factor, bole condition, largely determine whether or not a particular white pine tree is a "good mortality risk" to leave in partial cutting.[2] Vigor also mainly determines the growth capacity of a tree. Marking for partial cuttings on the basis of risk, capacity for growth, and proper spacing for ribes control and tree growth is a desirable practice in white pine stands in the Inland Empire.

Although timber markers agree in general ways on evaluating vigor of western white pine, a systematic classification has been needed to standardize the ratings. The vigor classification at the end of this report was developed in a study of partial cuttings in western white pine stands from 1939 to 1951. The study was conducted in 14 sample stands totaling 111 acres of sample plots with 5,561 tagged white pine trees containing over 3 million board feet of volume. These tagged trees were described in detail and rated for vigor according to the classification scheme shown in the table.

Many characteristics of each tree were described, but the ones finally selected for inclusion in the rating scheme were crown class, crown density, crown length, crown width, crown color, tip vigor, and presence of dead branches in the upper crown.

1/ The author expresses his thanks to J. C. Evenden, Bureau of Entomology and Plant Quarantine, for assistance and encouragement in the field work on which the vigor classification is based and for aid in preparation of the classification and this research note. Appreciation is also extended to E. E. Bentley, V. L. Benton, M. W. Foiles, A. E. Helmers, and R. F. Watt, who assisted in establishing and measuring sample plots which are the basis of the classification, and to Russell K. LeBarron for help in preparation of this report.

2/ "Risk" as used here refers to susceptibility to killing by natural agents such as beetles, wind, and snow.

The classification scheme has been verified in field tests. Ten-year results from seven sample plots containing 56 acres with 3,656 tagged white pine trees showed that both mortality and diameter growth reacted consistently with the vigor ratings. In other words, trees rated as poor in vigor had higher mortality rates and slower growth rates than trees which were classed as good or excellent in vigor. Mortality showed a consistent relationship to vigor classes for all major causes of death. Wind and snow losses were about five times as severe for poor vigor trees as for excellent vigor trees, and mountain pine beetle losses were about six times as severe.

In application of the classification system, the strongest characteristics are crown class and crown density. However, all the characters listed should be considered in arriving at the vigor class for a particular tree. The limiting characteristic determines the rating of the tree. For example, a dominant white pine with a crown 50 percent in length, of average width, green in color, with a tip of good vigor, and dead branchlets in upper crown lacking, but with only a fair density, rates good vigor. This tree measures up to the excellent vigor class in all respects except density of crown which, because it is only fair, reduces the tree to the good vigor class.

Estimating density of crown, width of crown, and tip vigor requires some familiarity with white pine forests. It has been found, however, that a timber marker inexperienced with the classification scheme soon acquires the necessary precision in judging these characteristics. Although most of the characteristics for rating vigor are qualitative, the terms given in the table are largely self-explanatory to qualified timber markers and other silviculturists.

In marking for partial cutting, tree vigor should receive major consideration, but other important factors should also be given proper weight. Bole condition, including amount of heart rot and forking, especially presence of dead forks, must be judged along with vigor in deciding if a tree is a "good risk". Badly defective trees are subject to wind and snow breakage. Proper spacing, either for good tree growth or for ribes suppression, may dictate the cutting or leaving of certain trees. The vigor classification should be regarded as an aid to timber markers in meeting silvicultural management objectives rather than as a marking rule.

VIGOR CLASSIFICATION FOR MATURE[1] WESTERN WHITE PINE TREES

C. A. WELLNER[2]

CHARACTERISTICS[3]	EXCELLENT	GOOD	FAIR	POOR
CROWN CLASS	CODOMINANT	CODOMINANT	INTERMEDIATE	SUPPRESSED
CROWN DENSITY	GOOD	ORDINARILY GOOD, OCCASIONALLY FAIR	ORDINARILY FAIR, OCCASIONALLY POOR, RARELY GOOD	USUALLY POOR, OCCASIONALLY FAIR, RARELY GOOD
LIVE CROWN LENGTH IN PERCENT OF TOTAL TREE HEIGHT	(LONG) USUALLY 50 OR MORE 40 ONLY IF CROWN WIDTH IS MORE THAN AVERAGE	(AVERAGE) 30–50 30 IF OF GOOD DENSITY AND AVERAGE WIDTH; 40–50 IF OF FAIR DENSITY AND AVERAGE WIDTH; MORE THAN 50 IF GOOD DENSITY AND NARROW	(SHORT) 20–30 20–30 IF OF FAIR DENSITY AND AVERAGE WIDTH; 30 IF OF GOOD DENSITY BUT NARROW; OVER 30 IF (A) AVERAGE WIDTH AND POOR DENSITY OR (B) NARROW	(VERY SHORT) 20 OR LESS MORE THAN 20 IF POOR IN OTHER RESPECTS
CROWN WIDTH	AVERAGE	USUALLY AVERAGE, OCCASIONALLY NARROW	USUALLY NARROW TO AVERAGE	USUALLY NARROW TO AVERAGE
CROWN COLOR	HEALTHY GREEN	HEALTHY GREEN	HEALTHY GREEN	GREEN OR YELLOWISH
TIP VIGOR[4]	GOOD	FAIR TO GOOD	POOR TO GOOD	USUALLY POOR TO FAIR. IF TIP VIGOR AND CROWN DENSITY ARE BOTH POOR, PLACE IN THIS CLASS
DEAD BRANCHLETS OR BRANCHES IN UPPER CROWN	INFREQUENT	SPARSE	MODERATE FREQUENCY	ABUNDANT

1/ GENERALLY OVER 100 YEARS IN AGE.

2/ U. S. DEPT. OF AGRICULTURE, FOREST SERVICE.

3/ DESCRIPTIONS OF CHARACTERISTICS FOR EACH VIGOR CLASS GENERALLY STATE THE LOWEST POSSIBLE OR LIMITING CONDITION.

4/ JUDGE MORE BY SHOOT ELONGATION AND DENSITY THAN BY PROFILE SHAPE.